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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

DUONG, THOI V

ART UNIT PAPER NUMBER

2871

DATE MAILED: 05/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/667,006

Applicant(s)

KWON ET AL.

Examiner

Thoi V Duong

Art Unit

2871

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19, 21 and 22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-19, 21 and 22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on March 10, 2004 has been entered.

Accordingly, claims 1 and 10 were amended, and claim 20 was cancelled. Currently, claims 1-19, 21 and 22 are pending in this application.

Response to Arguments

2. Applicant's arguments with respect to claims 1-19, 21 and 22 have been considered but are moot in view of the new ground(s) of rejection.

Claim Objections

3. Claim 21 is objected to because of the following informalities: claim 21 should be dependent on claim 10 instead of claim 20 since claim 20 was cancelled. Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakashima et al. (USPN 6,141,123) in view of Shirochi (USPN 6,075,581) and Tedesco et al. (USPN 5,471,327).

Re claim 1, as shown in Figs. 12A-12D, Nakashima et al. discloses a method for fabricating a hologram diffuser which comprises:

- providing a substrate 211;
- forming a resin layer 210 on the substrate 211; and
- forming a hologram pattern in the resin layer.

However, Nakashima et al. does not disclose forming a smoothing film on the patterned resin layer and forming the hologram diffuser uniformly diffusing light in all directions.

As shown in Fig. 11, Shirochi discloses a liquid crystal display comprising a diffraction grating 51 and an adhesive transparent resin 53 having a refractive index different from that of the grating surface 51a of the diffraction grating 51 (col. 19, lines 4-12). Accordingly, this resin layer is a smoothing layer which smoothes the surface of the diffraction grating and activates light beam diffusion at the diffraction grating.

Further, as shown in Fig. 4, Tedesco et al. discloses a hologram diffuser 126 which uniformly diffuses light in all orientations (col. 2, lines 30-41 and col. 4, lines 33-62).

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to fabricate a hologram diffuser to uniformly diffuse light in

all directions for realizing a display with high aspect ratio as taught by Tedesco et al. (col. 1, lines 6-11).

Re claim 3, Nakashima et al. discloses the step of forming the hologram pattern including:

locating an original hologram plate 213 at an upper portion of the resin layer 210;

pressing to form a hologram pattern in the resin layer by using a roller 229 (see also Fig. 13 and col. 16, lines 45-50);

hardening the resin (col. 18, lines 26-31); and

removing the original hologram plate 213 (col. 18, lines 19-25).

Re claims 4 and 5, Nakashima et al. discloses that the resin layer 210 is made from a thermal hardening resin, and further including the step of curing the resin layer by applying heat; and the resin layer is made from an ultraviolet hardening resin, and further including the step of curing the resin layer by applying ultraviolet light (col. 18, lines 26-31).

Re claim 6, Nakashima et al. also discloses that the resin layer formed of polycarbonate (col. 4, lines 36-39) is coated on the substrate (col. 15, lines 59-65) and has a thickness of 10 micrometers (col. 16, lines 24-26).

Re claim 2, as shown in Fig. 11, Shirochi discloses a color filter layer formed in color filter glass 23D at an upper portion of the smoothing layer 53 (col. 19, lines 4-12).

Re claim 7, as known in the art, spin coating, knife coating or extrusion coating may be used for forming the resin layer on the substrate.

Re claim 9, as known in the art, the refractive index of polycarbonate is 1.586 and that of transparent resin is from 1.5 to 2.0. Accordingly, with proper selection, the smoothing layer formed of transparent resin will have a refractive index difference of greater than 0.1 compared to the refractive index of the resin layer formed of polycarbonate.

Re claim 8, it is obvious that the smoothing (adhesive) layer is formed to have a desired thickness of 0.1 to 5 micrometers so as to secure the hologram layer in place as well as to obtain a thin display.

6. Claims 10, 17, 18, 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shirochi (USPN 6,075,581) in view of Tedesco et al. (USPN 5,471,327).

Re claims 10, 17, 18, 21 and 22, as shown in Fig. 11, Shirochi discloses a liquid crystal display (LCD) comprising:

- a lower polarizer 24,
- a lower substrate 22 arranged at an upper portion of the lower polarizer, switching devices arranged in a matrix on the substrate (col. 18, lines 54-59);
- a liquid crystal layer 21 provided at an upper portion of the lower substrate;
- a color filter layer 18 formed on the liquid crystal layer (col. 18, lines 60-65);
- an upper substrate 52 arranged on the color filter;
- an upper polarizer 25 arranged above the upper substrate;
- a diffraction grating 51 arranged between the upper substrate and the upper polarizer for diffusing light (col. 19, lines 22-28); and

a smoothing layer 53 (an adhesive transparent resin) provided at the upper portion of the diffraction grating 51, wherein the smoothing layer smoothes a surface of the hologram layer and activates light beam diffusion at the diffuser since the smoothing layer has a refractive index different from that of the grating surface 51a of the diffraction grating 51 (col. 19, lines 4-12); and

a back light unit 12 disposed below the lower polarizer.

Shirochi discloses a LCD that is basically the same as that recited in claims 10, 17, 18, 21 and 22 except that the diffraction grating is not a hologram diffuser uniformly diffusing light in all directions.

As shown in Fig. 4, Tedesco et al. discloses a hologram diffuser 126 which uniformly diffuses light in all orientations for a flat-panel LCD (col. 2, lines 30-41 and col. 4, lines 33-62).

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the liquid crystal display of Shirochi by employing a hologram diffuser which uniformly diffuses light in all directions for realizing a display with high aspect ratio for the display (col. 1, lines 6-11).

7. Claims 11-14 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shirochi (USPN 6,075,581) in view of Tedesco et al. (USPN 5,471,327) as applied to claims 10, 17, 18, 21 and 22 above and further in view of Nakashima et al. (USPN 6,141,123).

The liquid crystal display of Shirochi as modified in view of Tedesco above includes all that is recited in claims 11-14 and 19 except for the hologram layer

Art Unit: 2871

comprising a resin selected from a thermal hardening resin and an ultraviolet hardening resin, the refractive index difference between the hologram layer and the smoothing layer, and the thicknesses of the hologram layer and the smoothing layer.

Re claim 14, as shown in Fig. 13, Nakashima discloses a hologram layer 201 comprising a resin selected from a thermal hardening resin and an ultraviolet hardening resin (col. 8, lines 53-67),

Re claim 12, Nakashima discloses that the hologram layer is formed of polycarbonate (col. 4, lines 36-39), diffuses light (col. 1, lines 6-11) and has a thickness of 10 micrometers (col. 16, lines 24-26).

Re claim 19, Nakashima discloses that a shape of the hologram layer pattern controls a range of visual angle (col. 1, lines 6-11).

Re claim 11, as known in the art, the refractive index of polycarbonate (hologram layer) is 1.586 and that of transparent resin (smoothing layer) is from 1.5 to 2.0. Accordingly, with proper selection, a refractive index difference between the smoothing layer formed of transparent resin and the hologram diffuser formed of polycarbonate is greater 0.1.

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the LCD of Shirochi with the teaching of Nakashima et al. by employing a hologram diffuser having proper refractive index and thickness to provide excellent heat resistance and minimize deformation of the diffuser (col. 4, lines 16-25)

Finally, re claim 13, it is obvious that the smoothing (adhesive) layer is formed to have a desired thickness of 0.1 to 5 micrometers so as to secure the hologram layer in place as well as to obtain a thin display.

8. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shirochi (USPN 6,075,581) in view of in view of Tedesco et al. (USPN 5,471,327) as applied to claims 10, 17, 18, 21 and 22 above and further in view of Abileah et al. (USPN 5,629,784).

The LCD of Shirochi as modified in view of Tedesco et al. includes all that is recited in claims 15 and 16 except for a twisted nematic liquid crystal display and the upper and lower polarizers are crossed perpendicular to each other.

As shown in Fig. 3, Abileah discloses a twisted nematic liquid crystal display comprising a nematic liquid crystal 9 disposed between an upper polarizer 15 and a lower polarizer 3, wherein the transmission axes of the upper polarizer and the lower polarizer are crossed perpendicular to each other for rendering normally white display (col. 8, line 56 through col. 9, line 2).

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the LCD of Shirochi with the teaching of Abileah et al. by employing a twisted nematic LCD having the upper polarizer and the lower polarizer crossed perpendicular to each other so as to obtain a normally white display (col. 8, line 56 through col. 9, line 2).

Art Unit: 2871


Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thoi V. Duong whose telephone number is (571) 272-2292. The examiner can normally be reached on Monday-Friday from 8:30 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim, can be reached at (571) 272-2293.

Thoi Duong

05/10/2004


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